

REMARKS

Applicants have thoroughly reviewed the outstanding Advisory Action and the earlier Office Action including the Examiner's remarks and the reference cited therein. The following remarks are believed to be fully responsive to the Office Action and, when coupled with the above amendments, are believed to render all claims at issue patentably distinguishable over the cited references.

Claims 1 through 19 are cancelled. Claim 20 is amended. No Claims are added. Accordingly, Claims 20 through 28 remain pending.

Applicants respectfully request reconsideration in light of the above amendments and the following remarks.

CLAIM REJECTIONS – 35 U.S.C. SECTION 112

The Examiner rejected Claims 20 through 28 under 35 U.S.C. 112, second paragraph, as failing to set forth the subject matter which applicants regard as their invention.

In brief, the main substantive change to independent Claim 20 includes the amended recitation –no Cl—. This change has been made for clarification and is supported by the specification and drawings as originally filed.

It is respectfully submitted that no new matter is added to Claims 20-28 by these changes.

CLAIM REJECTIONS- 35 U.S.C. SECTION 102 (e)

With respect to Page 2 through Page 3 of the final Office Action, the Examiner rejected Claims 1-19 under 35 U.S.C. Section 102 (e) as being anticipated by US patent 6,163,050 Hisatomi et al.

Applicants respectfully traverse the rejection in light of the above amendments.

CLAIM REJECTIONS-35 U.S.C. SECTION 103(a)

With respect to Page 3 through Page 5 of the final Office Action, the Examiner rejected Claims 20 through 22, 25 and 27 through 28 under 35 U.S.C. 103 (a) as being unpatentable over Hisatomi et al. (U.S. patent No. 6,163,050) in view of Yamazaki et al. (U.S. patent No. 6,323,142), and rejected Claims 23, 26 under 35 U.S.C. 103 (a) as being unpatentable over Hisatomi et al. (U.S. patent No. 6,163,050) in view of Laxman et al. (U.S. patent No. 5,976,991).

The Examiner is of the opinion that Hisatomi does not expressly disclose that the first oxide layer does not include Cl, and wherein the first and second oxide layers are formed by introducing silane gas and nitrogen gas. However, Yamazaki discloses the oxide layer not including Cl. Therefore, it would have been obvious to one of ordinary skill in the art to use the oxide film of Yamazaki with the method of Hisatomi to achieve Claims 20-22, 25 and 27-28 of this present Application.

Applicant respectfully traverses these rejections.

Initially, in Hisatomi's disclosure, a semiconductor device includes a first and a second CVD silicon oxide film containing Cl (claim 1, 2, and 3). Furthermore, Hisatomi teaches a manufacture method in which **the formation of silicon oxide films (36-1 and 36-3) by reacting dichloro silane gas with N₂O gas** (col.6, lines 40-44, and 51-54). Furthermore, Hisatomi is of the opinion that when dust is present on the surface of the silicon nitride film, dust can be covered with the silicon oxide film containing Cl (col. 7, lines 29-33). Accordingly, **the silicon oxide film taught by Hisatomi definitely contains Cl.**

However, independent Claim 20 emphasizes that **the oxide layer includes no Cl.** Thus, the silicon oxide film disclosed by the present Application is definitely different from the silicon oxide film taught by Hisatomi. Accordingly, it is definitely non-obvious to one of ordinary skill in the art to form the silicon oxide film disclosed by the present Application with the Hisatomi method.

On the other hand, Yamazaki teaches a manufacturing method of a semiconductor device comprising passing H₂ to form a hydrogen radical and forming an oxide layer by introducing an organic silane type source gas and oxidizing gas and the hydrogen radical (claims 1 and 6). Furthermore, Yamazaki teaches that hydrogen is used as a decarbonization source gas

(col. 13, lines 47-48). Thus, **the disclosure of Yamazaki becomes effective when the supply ratio of hydrogen to organic silane is not less than 0.01** (col. 13, lines 62-65).

Accordingly, it is hard that the formation of oxide film taught by Yamazaki is implemented with the combination of the Hisatomi method since **the combination of Yamazaki and Hisatomi would not ensure the supply ratio of hydrogen to organic silane for Yamazaki's invention**. That is, the effect and object of combination of Yamazaki and Hisatomi would be deteriorated. Accordingly, it is non-obvious to one of ordinary skill in the art to know the method taught by the present Application over the Hisatomi method in view of the Yamazaki method.

Furthermore, Laxman discloses a method for forming silicon oxide and silicon oxynitride films **using bis(tertiary butylamino)silane (BTBAS) as an organo-silicon source material**. In Laxman's disclosure, **Laxman employs BTBAS instead of silane and dichlorosilane** because of the following reasons: (i) silane and dichlorosilane are pyrophoric, toxic compressed gases; (ii) Oxide depositions with dichlorosilane require very high temperatures and have very low deposition rates. The films may contain chlorine and there is a significant particle contamination problem; and (iii) Films formed using silane are not dense and are hygroscopic. This process requires expensive "caged boats" to obtain usable deposited film uniformities. Small deviations in oxygen to silane ratios may produce

homogeneous reactions that will produce significant particle contamination (column 1 lines 44-56). Accordingly, if the combination of the SiON film formation teaching of Laxman and Hisatomi's method would be possible, the present Application cannot be taught by the combination of the disclosure of Hisatomi and Laxman.

Accordingly, the applicant respectfully submits that the recited Claims 20 through 28 are patentable over Hisatomi, Yamazaki, and Laxman. Reconsideration and withdrawal of the rejection under 35 U.S.C. Section 103 is respectfully requested.

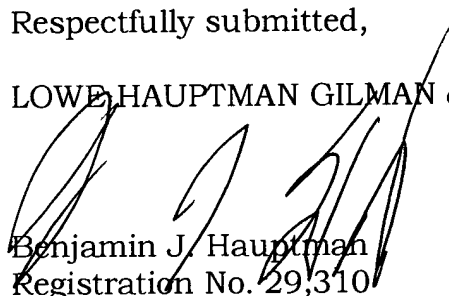
Conclusion

In the light of the above amendments and remarks, Applicant respectfully submits that all pending Claims 20-28 as currently presented are in condition for allowance. Attached hereto is a marked-up version of the changes made to the claims by current amendment. The attached page is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE". Applicant has thoroughly reviewed that art cited but relied upon by the Examiner. Applicant has concluded that these references do not affect the patentability of these claims as currently presented. Accordingly, reconsideration is respectfully requested.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 07-1337 and please credit any excess fees to such deposit account.

Respectfully submitted,

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Date: April 30, 2003

VERSION WITH MARKING TO SHOW CHANGES MADE

CLAIMS

Claims 1-19 are cancelled.

Claim 20 is amended as follows:

20. (Twice Amended) A method for forming an oxide-nitride-oxide structure in one chamber, the method comprising the steps of:

providing a substrate;

forming a first oxide layer on said substrate, wherein said first oxide layer includes no [not essentially] Cl;

forming a first buffer layer on said first oxide layer;

forming a silicon nitride layer on said first buffer layer;

forming a second buffer layer on said silicon nitride layer; and

forming a second oxide layer on said second buffer layer.